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Various Parameter Measurements in Dual-ECR Heating on Electron Cyclotron Resonance Ion Source

We have been researching about efficient generation of multiply-charged Ar ion on electron cyclotron resonance ion source (ECRIS). Confining the plasma magnetically, ECRIS is one of the major ion sources on accelerators because it is possible to generate plasma efficiently by introducing microwaves. On conventional ECRIS, microwaves are introduced from upstream side of the mirror field at the opposite side of ion beam extraction. On the other hand, our ECRIS has some ports for measurements, so microwaves are introduced from downstream side of the mirror field at the side of ion beam extraction and we succeeded in generating multiply-charged Ar ion. In addition, we succeeded in generating multiply-charged Ar ion by Dual-ECR heating, which means we introduced microwaves both the rod antenna at the downstream side and the coaxial antenna at the upstream side. We measured the distribution of ion saturation current perpendicular to the magnetic field at several positions. Our previous parameters obtained about Dual-ECR heating had been only two parameters, i.e., the beam current and the ion saturation current. We obtained the relationship between a net microwave power and the beam current of multiply-charged Ar ion and confirmed increase of the ion saturation current related. After that, we measured the beam current and plasma parameters such as electron density and electron temperature, and we obtained their spatial distributions. As a result, it was revealed for the first time that the beam current of multiply-charged Ar ion and the plasma parameters were corelating for each antenna and Dual-ECR heating. This paper will describe the measurement results of the beam current and plasma parameters for cases of each antenna and Dual-ECR heating.

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Yes

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